

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

REC'D 21 DEC 2004

WIPO PCT

Applicant's or agent's file reference P650447WO	FOR FURTHER ACTION		See Notification of Transmittal of International Preliminary Examination Report (Form PCT/PEA/416)
International application No. PCT/GB 03/04101	International filing date (day/month/year) 26.09.2003	Priority date (day/month/year) 02.10.2002	
International Patent Classification (IPC) or both national classification and IPC F16D65/12			
Applicant FEDERAL-MOGUL PRODUCTS INC. ET AL			

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 5 sheets, including this cover sheet.

☒ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of 3 sheets.

3. This report contains indications relating to the following items:

I ☒ Basis of the opinion

II ☐ Priority

III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability

IV ☐ Lack of unity of invention

V ☒ Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

VI ☐ Certain documents cited

VII ☐ Certain defects in the international application

VIII ☐ Certain observations on the international application

Date of submission of the demand 22.04.2004	Date of completion of this report 22.12.2004
Name and mailing address of the International preliminary examining authority: <div style="display: flex; align-items: center;"> <div> European Patent Office - P.B. 5818 Patentlaan 2 NL-2280 HV Rijswijk - Pays Bas Tel. +31 70 340 - 2040 Tx: 31 651 epo nl Fax: +31 70 340 - 3016 </div> </div>	Authorized Officer Topolski, J Telephone No. +31 70 340-3785



**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT**

International application No. **PCT/GB 03/04101**

I. Basis of the report

1. With regard to the **elements** of the international application (*Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17)*):

Description, Pages

1-10 as originally filed

Claims, Numbers

1-11 received on 22.04.2004 with letter of 22.04.2004

Drawings, Sheets

1/3-3/3 as originally filed

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
 - ☐ the language of publication of the international application (under Rule 48.3(b)).
 - ☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).
3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:
- ☐ contained in the international application in written form.
 - ☐ filed together with the international application in computer readable form.
 - ☐ furnished subsequently to this Authority in written form.
 - ☐ furnished subsequently to this Authority in computer readable form.
 - ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
 - ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
- ☐ the claims, Nos.:
- ☐ the drawings, sheets:

**INTERNATIONAL PRELIMINARY
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International application No. **PCT/GB 03/04101**

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)).
(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)

6. Additional observations, if necessary:

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes: Claims	1-11
	No: Claims	
Inventive step (IS)	Yes: Claims	
	No: Claims	1-11
Industrial applicability (IA)	Yes: Claims	1-11
	No: Claims	

2. Citations and explanations

see separate sheet

Re Item V

Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

Reference is made to the following documents:

D1: EP-A-0 143 264 (SCHWAEBISCHE HUETTENWERKE GMBH) 5 June 1985 (1985-06-05)

D2: DE 39 24 849 A (DAIMLER BENZ AG) 7 February 1991 (1991-02-07)

1. The present application does not meet the criteria of Article 33(1) PCT, because the subject-matter of claim 1 does not involve an inventive step in the sense of Article 33(3) PCT.

1.1 The document D1 is regarded as being the closest prior art to the subject-matter of claim 1, and discloses (the references in parentheses applying to this document):

A disc brake rotor arranged to rotate with a hub about an axis and providing two oppositely-facing annular radially-extending friction surfaces (10, 11) which, in the operation of the brake, are engaged by blocks of friction material to decelerate the rotor and hence the hub, the rotor comprising a mounting portion (6) extending axially between an end thereof which is adapted to be mounted on the hub and an opposite end thereof, the rotor also comprising two friction portions (8, 9) each of which provides one of said annular surfaces (10, 11) the friction portions being arranged in spaced parallel relationship with one of said friction portions (9) being supported by said opposite end (18) of the mounting portion (6) and the other friction portion (8) being positioned so that it extends around the mounting portion (6) and is supported by vanes (12) extending between the friction portions, said vanes (12) also defining cooling ducts (13) and entrances to said ducts, the cooling ducts being arranged so that, as the rotor is rotated, air passes through the ducts (13) and acts to cool the friction portions (8, 9), the mounting portion (6) also defining a plurality of inlets (7) through which air can pass to said ducts (13), the inlets (7) being distributed circumferentially around said mounting portion (6), **wherein** each inlet is defined by a bounding surface which includes a section extending between the circumferential extremities of the inlet, said section facing away from the friction portion (8, 9) supported by the mounting portion (6), said section being continuously curved, symmetrical about an axial centre-line of the inlet, the inlet extending axially opposite to the entrances of said cooling ducts

between the friction portions (see especially figs. 1, 2).

- 1.2 The subject-matter of claim 1 therefore differs from this known disc brake rotor in that: the inlet section has a shape wherein it is extending axially less than half its circumferential extent.
- 1.3 The problem to be solved by the present invention may therefore be regarded as insufficiently optimized cooling efficiency.
- 1.4 The solution proposed in claim 1 of the present application cannot be considered as involving an inventive step (Article 33(3) PCT) for the following reasons.
 - 1.4.1 The feature of having apertures in a hub section of the shape specified in paragraph 1.2 is a matter of normal design procedure, see for example document D2 (fig. 1). Having the knowledge about the shape of such apertures in a hub section, the skilled person would therefore regard it as a normal design option to include this feature in the disc brake rotor described in document D1 in order to solve the problem posed.

2. Dependent claims 2-11:

The dependent claims 2-11 do not appear to contain any additional features which, in combination with features of any claim to which they refer, meet the requirements of the PCT with respect to inventive step, as all the features introduced with these claims seem to be known from a combination of D1 and D2 or known while used with a known corresponding effect and/or seem to introduce slight constructional changes without inventive meaning and which come within the scope of the customary practice followed by persons skilled in the art.

**REPLACED BY
ART 34 AMDT****CLAIMS**

- 1 A disc brake rotor arranged to rotate with a hub about an axis and providing two oppositely-facing annular radially-extending friction surfaces which, in the operation of the brake, are engaged by blocks of friction material to decelerate the rotor and hence the hub, the rotor comprising a mounting portion extending axially between an end thereof which is adapted to be mounted on the hub and an opposite end thereof, the rotor also comprising two friction portions each of which provides one of said annular surfaces the friction portions being arranged in spaced parallel relationship with one of said friction portions being supported by said opposite end of the mounting portion and the other friction portion being positioned so that it extends around the mounting portion and is supported by vanes extending between the friction portions, said vanes also defining cooling ducts, the cooling ducts being arranged so that, as the rotor is rotated, air passes through the ducts and acts to cool the friction portions, the mounting portion also defining a plurality of inlets through which air can pass to said ducts, the inlets being distributed circumferentially around said mounting portion, characterised in that each inlet is defined by a bounding surface which includes a section extending between the circumferential extremities of the inlet, said section facing away from the friction portion supported by the mounting portion, said section being continuously curved, symmetrical about an axial centre-line of the inlet, and extending axially less than half its circumferential extent.
- 2 A disc brake rotor according to claim 1 characterised in that said section of the bounding surface of the inlet has an arch-like shape.
- 3 A disc brake rotor according to either one of claims 1 or 2 characterised in that said section of the bounding surface of the inlet has a shape

REPLACED BY
ART 34 AMDT

which is that of half of an ellipse having its major axis aligned circumferentially of the mounting portion.

- 4 A disc brake rotor according to any one of claims 1 to 3, characterised in that the remainder of the bounding surface of the inlet is symmetrical about said axial centre-line, and is formed by two elliptical sections joined by a section which extends circumferentially.
- 5 A disc brake rotor according to any one of claims 1 to 3, characterised in that the remainder of the bounding surface of the inlet is symmetrical about said axial centre-line, and is formed by an elliptical section.
- 6 A disc brake rotor according to any one of claims 1 to 5, characterised in that the transverse cross-sectional area of each duct decreases progressively between an entrance to the duct and an intermediate region thereof and increases between said intermediate region and an exit of the duct, the surfaces of the friction portions which bound the ducts extending as convex curves between entrances of the ducts and exits thereof.
- 7 A disc brake rotor according to claim 6, characterised in that the variation of said transverse cross-sectional area of the ducts is achieved by variation in the thickness of said friction portions of the rotor.
- 8 A disc brake rotor according to any one of claims 1 to 7, characterised in that the total extent of said inlets circumferentially is more than half of the circumferential extent of the mounting portion.
- 9 A disc brake rotor according to any one of claims 1 to 8, characterised in that the number of inlets is a prime number greater than or equal to seven.

REPLACED BY
ART 34 AMDT

- 10 A disc brake rotor according to any one of claims 1 to 9, characterised in that the number of vanes is a prime number which is different from the number of inlets and is greater than eleven.